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# United States Department of Agriculture,

BUREAU OF CHEMISTRY.—Circular No. 14.

H. W. WILEY, Chief.

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## ORGANIZATION OF THE BUREAU OF CHEMISTRY.

### GENERAL STATEMENT.

For practical administration and for the economical arrangement of its work the Bureau of Chemistry is divided into divisions and laboratories according to the questions which are to be studied and the classes in which the work can be most conveniently arranged. The purpose and scope of the Bureau are best described by stating briefly the work done in each division and laboratory.

The ground covered by the investigations of the Bureau of Chemistry in past years is marked out by its publications, a list of which is included in this circular. It is the aim of the Bureau of Chemistry to confine its attention to questions of agricultural chemistry that are of public interest and to such other chemical investigations as may be referred to it by other departments of the Government. Inquiries which are of value to individuals only, or to a small group of individuals, can not be taken up. Investigations of plans and processes which are of use only to a manufacturer requesting such investigations can not be made. On the other hand, where such investigation may result to the advantage of the public in general, and not especially to a single individual or group of individuals, such work may be undertaken.

In general, the Bureau is unable to examine miscellaneous samples sent to it for that purpose. Samples of foods, waters, soils, drugs, and other miscellaneous samples are received from time to time with a request for their analysis, but such requests are usually denied as their number and the time the work would require make it impracticable for the Bureau to comply with them. The only exception to this general rule is made in regard to road materials, samples of which are examined for individuals as stated under the description of the work of the Division of Tests.

### DIVISION OF FOODS.

W. D. BIGELOW, *Chief.*

The Division of Foods is charged with the food investigations made by the Bureau. In the past much work has been done with various kinds of food purchased in the open market, in order to determine their purity and the character of adulteration commonly practiced. Careful attention has long been given to this subject under the provisions of the Appropriation Act authorizing the Bureau of Chemistry to investigate the adulteration, false labeling, and false branding of food products.

At the present time the attention of the Division of Foods is chiefly occupied with researches on the effect of preservatives on nutrition, and with the enforcement of the imported food law.

Aside from the other inquiries mentioned, the Division of Foods studies analytical methods necessary for the examination of food. This work is partly done in collaboration with the Association of Official Agricultural Chemists, of which the Chief of the Division of Foods is referee on food adulteration. The Division of Foods is also engaged in collaborative work with the pomologists of the Bureau of Plant Industry on the study of the ripening of fruit.

*Food inspection.*—One of the most important activities of the Bureau of Chemistry consists in the inspection of imported food products under the law which went into effect on July 1, 1903. Under the provisions of this law the Secretary of Agriculture is authorized to inspect all imported food products, including under this head what is known generally as foods, beverages, condiments and ingredients used in the manufacture thereof. Every invoice of food products coming into this country is accompanied by a declaration made before a United States consul concerning the character of the shipment. The law requires that each package of food products shall be correctly labeled or branded in regard to the nature thereof and the place of production or manufacture. It also provides that no substance deleterious to health shall be added to any food product, and that food products which are forbidden or restricted in sale in the country where made or from which exported shall not be admitted into the United States. In the execution of this law collaboration has been established between the State and Treasury departments. Through the State Department our consuls are instructed to secure from intending shippers a full description of the character of the goods which they propose to send, in the form of a duplicate of the invoice. To this duplicate is attached a declaration made by the shipper to the effect that the food products covered by the invoice in question do not in any way differ from the character of such products required by the inspection law. This invoice and declaration are sent by fast mail direct to the Department of Agriculture. The Treasury Department collaborates in the execution of this law by securing samples of such invoices as may be suspected of being adulterated, misbranded, or of containing a deleterious substance. Samples of these goods are secured by the agents of the Treasury at the ports of entry and forwarded to the Department of Agriculture for examination. Meanwhile the goods covered by the invoice are detained or removed under bond pending the result of the examination made by the Bureau of Chemistry. If the examination shows that the food products are of such a nature as to violate the provisions of the law, the importer is notified and given an opportunity to explain the matter. If the explanation is satisfactory the invoice is released and the goods

admitted; if not, the importer is required to reship the goods covered by the invoice beyond the jurisdiction of the United States. If this is not done within 90 days from the time of notification, the Secretary of the Treasury takes possession of the goods and destroys them under the provisions of a statute which has long been in force.

The result of this inspection has been most salutary. The character of the products imported into the United States has greatly improved since the law went into effect. In order to make the execution of the law more complete a branch laboratory has been established in San Francisco for the examination of all samples taken on the Pacific coast. It is intended in the near future to establish other branch laboratories, first of all at New York, at which port by far the largest quantity of food products imported into the United States enters.

#### DIVISION OF TESTS.

LOGAN WALLER PAGE, *Chief*. ALLERTON S. CUSHMAN, *Assistant Chief*.

The chief object of this division is to make standard tests on road material, free of charge, for the citizens of the United States. In addition to this, allied problems are studied, such as the suitability of clays for the manufacture of paving brick, drain tile, etc.; the testing of cements and concretes for road foundations, drains, gutters, and highway bridges. It is the intention of this division to aid, as far as possible, in the solution of all the problems of road building, but more particularly those relating to rural highways. It is not, however, the policy of the Department to undertake scientific investigations or tests of materials for manufacturers or others who desire to use the information thus acquired to promote commercial ends.

Any person desiring to have road materials tested will, on application, be supplied with instructions for collecting and shipping samples to the laboratory. Detailed information in regard to the methods of conducting tests is given in Bulletin No. 79 of the Bureau of Chemistry.

#### SUGAR LABORATORY.

[Under the personal supervision of the Chief of Bureau.]

The sugar laboratory is charged with the chemical study of sugars and other carbohydrates. One of its principal duties is to examine the samples of sugar beets grown in collaboration with the agricultural experiment stations to determine the effect of environment upon the sugar content. This laboratory is also charged, in conjunction with the Contracts Laboratory, with the work done for the Treasury Department in controlling the polarizations of sugar for dutiable purposes at the chief ports of entry. A sample of sugar is sent each day to this laboratory from the ports of New Orleans, Philadelphia, New York, and Boston. The chemical work relating to the domestic sirup industry, that is, the manufacture of table sirup from the maple sap, sorghum,

and sugar cane, is performed in the Sugar Laboratory, which also collaborates with the International Commission for Uniform Methods of Sugar Analysis in the standardization of international quartz plates for the control of polariscopes in different countries.

#### DAIRY LABORATORY.

G. E. PATRICK, *Chief*.

The Dairy Laboratory examines dairy products of every description and studies methods for such examination. A large part of the work is done in cooperation with the Bureau of Animal Industry which is charged with the enforcement of the law regulating the sale and manufacture of renovated butter (May 9, 1902).

The Dairy Laboratory examines samples of dairy products, mostly cheese, taken by the custom officers in the enforcement of the imported food law (March 3, 1903). Samples of dairy products received from other sources are examined whenever such work promises to be of public benefit. A thorough study has been made of the methods which have been proposed for distinguishing between renovated and genuine butter. The milk and butter consumed in the experiments now conducting by the Bureau of Chemistry upon the physiological effects of preservatives and coloring matters are also analyzed in this laboratory.

#### INSECTICIDE AND AGRICULTURAL WATER LABORATORY.

J. K. HAYWOOD, *Chief*.

This laboratory, in collaboration with the Bureau of Entomology, studies the composition of insecticides and fungicides sold on the American market with reference to their purity and practical value and with a view to increasing their efficiency. The effect of various insecticides, especially arsenical insecticides, on the foliage of fruit trees has been studied.

In connection with the irrigation investigations made by the Office of Experiment Stations the laboratory examines the irrigation waters of the West and Southwest, especially those used in the rice fields of Texas and Louisiana. An examination of the leading mineral waters of the United States is making which will be of value from a scientific standpoint, and will furnish data by which the statements made by bottlers of these waters and by dealers concerning their composition may be verified. As far as practicable the laboratory examines the water supplies of small communities which have no official chemist.

In addition to the above investigations for which the laboratory was organized, it is also engaged in a study of the composition of American cattle foods and of certain toxicological problems and questions relating to public health which do not come within the scope of the other laboratories.



## DRUG LABORATORY.

LYMAN F. KEBLER, *Chief.*

The drug laboratory was organized March 1, 1903. It examines medicinal remedies to determine whether they conform to the standards of the pharmacopœia. A careful study is making of remedies not included in the pharmacopœia for the purpose of developing methods of analysis and acquiring data which may lead to the establishment of uniform methods of analysis and standards of composition, of quality and strength. This question is studied with reference to the miscellaneous products now on the market, and with reference to the needs of the Department of Agriculture and other departments in their regular supplies. The laboratory examines regularly the chemicals used by the Bureau of Chemistry for the purpose of establishing standards and requiring contractors to conform to the specifications adopted. The laboratory also makes the analyses requested by the Post-Office Department in connection with fraudulent remedies offered through the mails.

Special attention is given to analytical methods for the examination of crude drugs and the products derived from them. The chief of the drug laboratory as referee on medicinal plants and drugs for the Association of Official Agricultural Chemists has undertaken a systematic collaborative work with other members of the association. For the present year this work includes methods for assaying opium and is conducted in such a way as to represent the scientist, the manufacturer, and the chemist interested in the administration of drug laws. It is hoped that this collaborative work will lead to the development of simpler and better methods for assaying drugs.

## CONTRACTS LABORATORY.

L. S. MUNSON, *Chief.*

The contracts laboratory was organized July 1, 1903, for the purpose of examining materials to be purchased by the U. S. Department of Agriculture, to determine their purity and compliance with specifications, and to do the collaborative work, provided for by law, with other departments which may request such assistance from the Secretary of Agriculture. The work of this laboratory is extremely varied, and consists largely of the examination of materials submitted with bids for contracts or furnished on contract for the various executive departments. It includes also the examination of a large number and variety of materials regarding which there has arisen some question of classification for dutiable purposes. This laboratory also assists in the comparative sugar tests made with the ports of Boston, New York, Philadelphia, and New Orleans, as a part of the cooperative work with the Treasury Department.

Among the more important lines of contract work may be mentioned the investigation and examination of inks and other materials used by

the Post-Office Department for postmarks and for canceling stamps; the examination of supplies for the Commissary Office, War Department, and the examination of chemical glassware used in the Bureau of Chemistry.

#### PLANT ANALYSIS LABORATORY.

C. C. MOORE, *Chief*.

On July 1, 1904, this laboratory was established and charged with the investigation of fertilizers in respect of composition, in which work the laboratory will cooperate with the referees of the Association of Official Agricultural Chemists, studying methods of analysis of fertilizers and fertilizing substances. Miscellaneous examinations of fertilizers are not made.

The laboratory is also to investigate the constitution of plants and is authorized to collaborate with the Bureau of Plant Industry in the chemical investigation of problems, in which the Bureau of Chemistry and the Bureau of Plant Industry are mutually interested.

#### MICROCHEMICAL LABORATORY.

B. J. HOWARD, *Chief*.

This laboratory was organized in 1901 for the purpose of centralizing the microscopical work of the Bureau (with the exception of the petrographical investigations) in one special microscopical laboratory.

It is charged with the microscopical and microchemical study of foods, drugs, cattle feed, paper and textile materials, miscellaneous agricultural products, etc. Special attention is given to the histological study of fruits, spices, cereals, starches, and other agricultural products, both on account of its scientific interest and for the purpose of perfecting methods for detecting the adulteration of these products. The laboratory makes microscopical examinations of the urine and blood in connection with the work of the Bureau on the influence of preservatives on nutrition.

#### LEATHER AND PAPER LABORATORY.

F. P. VEITCH, *Chief*.

This laboratory was established on July 1, 1904, for the conduct of the following investigations:

Investigations of tannins and tanning materials and their effects upon the strength and properties of leather with a view to promoting the agricultural industries relating to the production of tannins and tanning materials and leather of a high quality;

All technical problems of a chemical nature relating to the production of tannins and tanning products;

All technical problems of a chemical nature relating to the production of leather;

All chemical and physical investigations of papers in regard to their



fitness for use in the Department of Agriculture and other Departments of the Government which may request such investigations;

All technical problems of a chemical nature relating to the production of paper, with a view to promoting the agricultural industries connected with the production of the raw materials, and to the improvement of the quality of papers made.

#### MISCELLANEOUS INVESTIGATIONS.

From time to time various lines of investigation which do not come within the defined scope of any division or laboratory are taken up by the Bureau. Such investigations may be illustrated by the following cases:

*The influence of environment on the composition of certain agricultural products.*—In collaboration with the Weather Bureau of the Department of Agriculture and with a number of the State agricultural experiment stations this Bureau is specifically directed by Congress to study the influence of environment upon the chemical composition of wheat, barley, and of the sugar and starch producing plants. The need of further study of this subject is generally recognized and this Bureau has the active collaboration of a considerable number of the State experiment stations in its prosecution. These investigations are under the personal supervision of the Chief of Bureau.

*Oenological technology.*—This work is carried on under the direction of Mr. William B. Alwood, mycologist of the Virginia Agricultural Experiment Station and special agent of the Bureau of Chemistry. The investigation divides naturally into two parts, one dealing with the study of alcoholic ferments and the mal-organisms associated with them in fruit musts, ciders, wines, and fruit by-products; the other with the composition of fruits and fruit juices and their fermented products and the critical examination of the residue which is left in the marc or pomace as a comparatively waste product.

In the fermentation study the pure cultures of the various organisms which occur in fruit musts or similar products are separated. These organisms are isolated and their growth activities studied as alcoholic ferments or as mal-ferments which destroy the sugar, alcohol, acids, etc., which it is desired to produce.

The pure cultures which have given the greatest promise in Europe have been studied and compared with those isolated in this country. Having thus determined the vital activities, methods of control are studied that the cultures of pure ferments may be utilized to produce the desired qualities in products manufactured from fruit juices, and to either suppress or destroy undesirable organisms.

Approved:

JAMES WILSON,

*Secretary of Agriculture.*

WASHINGTON, D. C., July 1, 1904.

# PUBLICATIONS OF THE BUREAU OF CHEMISTRY.

NOTE.—To obtain those publications, to which a Price is affixed, application must be made to the Superintendent of Documents, Washington, D. C., to whom all remittances must be directed. Stamps and personal checks will not be accepted.

THE SUPERINTENDENT OF DOCUMENTS IS NOT AN OFFICIAL OF THE DEPARTMENT OF AGRICULTURE.

Publications for free distribution may be obtained on application to the Secretary of Agriculture, Washington, D. C. Free publications are not distributed by the Superintendent of Documents.

## BULLETINS.

No. 1. An Investigation of the Composition of American Wheat and Corn. By Clifford Richardson. 1873. Pp. 69. (Out of print.)

No. 2. Diffusion. Its Application to Sugar Cane, and Record of Experiments with Sorghum in 1883. By H. W. Wiley. 1884. Pp. 36, pls. 2. (Out of print.)

No. 3. The Northern Sugar Industry. A Record of its Progress during the Season of 1883. By H. W. Wiley. 1884. Pp. 120, charts 11. (Out of print.)

No. 4. An Investigation of the Composition of American Wheat and Corn. (Second report.) By Clifford Richardson. 1884. Pp. 98. (Out of print.)

No. 5. The Sugar Industry of the United States. By H. W. Wiley. 1885. Pp. 224, figs. 12, pls. 12, map. (Out of print.)

No. 6. Experiments with Diffusion and Carbonation at Ottawa, Kans., Campaign of 1885. By H. W. Wiley. 1885. Pp. 20. (Out of print.)

No. 7. Methods of Analysis of Commercial Fertilizers. (Proceedings of the Association of Official Agricultural Chemists, September 1 and 2, 1885.) Edited by Charles W. Dabney. 1885. Pp. 49. (Out of print.)

No. 8. Methods and Machinery for the Application of Diffusion to the Extraction of Sugar from Sugar Cane and Sorghum, and for the Use of Lime and Carbonic and Sulphuric Acids in Purifying the Diffusion Juices. By H. W. Wiley. 1886. Pp. 85, figs. 24. (Out of print.)

No. 9. Third Report on the Chemical Composition and Physical Properties of American Cereals, Wheat, Oats, Barley, and Rye. By Clifford Richardson. 1886. Pp. 82. (Out of print.)

No. 10. Principles and Methods of Soil Analysis. By Edgar Richards. 1886. Pp. 66. (Out of print.)

No. 11. Report of Experiments in the Manufacture of Sugar at Magnolia Station, Lawrence, La., Season of 1885-86. (Second report.) By Guilford L. Spencer. 1886. Pp. 26. (Out of print.)

No. 12. Method of Analysis of Commercial Fertilizers. (Proceedings of the Third Annual Convention of the Association of Official Agricultural Chemists, August 26 and 27, 1886.) 1886. Pp. 59. (Out of print.)

No. 13. Foods and Food Adulterants—

Part First: Dairy Products. By H. W. Wiley. 1887. Pp. 132, pls. 12, figs. 4. (Out of print.)

Part Second: Spices and Condiments. By Clifford Richardson. 1887. Pp. 130, pls. 16. (Out of print.)

Part Third: Fermented Alcoholic Beverages, Malt Liquors, Wine, and Cider. By C. A. Crampton. 1887. Pp. 140. (Out of print.)

Part Fourth: Lard and Lard Adulterations. By H. W. Wiley. 1899. Pp. 154, figs. 7, pls. 10. (Out of print.)

Part Fifth: Baking Powders. By C. A. Crampton. 1889. Pp. 73. (Out of print.)

Part Sixth: Sugar, Molasses and Sirup, Confections, Honey, and Bees-wax. 1892. Pp. 225. (Out of print.)

Part Seventh: Tea, Coffee, and Cocoa Preparations. By Guilford L. Spencer. 1892. Pp. 147, pls. 8. (Out of print.)

Part Eighth: Canned Vegetables. By K. P. McElroy. 1893. Pp. 64. (Out of print.)

Part Ninth: Cereals and Cereal Products. By H. W. Wiley. 1898. Pp. 206, pls. 8, figs. 4. Price 15 cents.

Part Tenth: Preserved Meats. By W. D. Bigelow. 1902. Pp. 152, figs. 3. Price 10 cents.

- No. 14. Record of Experiments at Fort Scott, Kans., in the Manufacture of Sugar from Sorghum and Sugar Canes, in 1886. By H. W. Wiley. 1887. Pp. 64. Price 5 cents. (Out of print.)
- No. 15. Reports of Experiments in the Manufacture of Sugar at Magnolia Station, Lawrence, La., Season of 1886-87. (Third report.) By Guilford L. Spencer. 1887. Pp. 35. Price 5 cents. (Out of print.)
- No. 16. Methods of Analysis of Commercial Fertilizers, Feeding Stuffs, and Dairy Products. Adopted at the Fourth Annual Convention of the Association of Official Agricultural Chemists, August 16, 17, and 18, 1887. Edited by Clifford Richardson. 1887. Pp. 80, figs. 4. (Out of print.)
- No. 17. Record of Experiments Conducted by the Commissioner of Agriculture in the Manufacture of Sugar from Sorghum and Sugar Canes at Fort Scott, Kans., Rio Grande, N. J., and Lawrence, La., 1887-88. 1888. Pp. 118, figs. 5. (Out of print.)
- No. 18. Sugar-producing Plants. Record of Analyses made by authority of the Commissioner of Agriculture under direction of the Chemist, 1887-88 (Sorghum—Fort Scott, Kans., Rio Grande, N. J.; Sugar Cane—Lawrence, La.), together with a study of the data collected on sorghum and sugar cane. 1888. Pp. 132. (Out of print.)
- No. 19. Methods of Analysis of Commercial Fertilizers, Cattle Foods, Dairy Products, Sugar, and Fermented Liquors, adopted at the Fifth Annual Convention of the Association of Official Agricultural Chemists, held at the U. S. Department of Agriculture, August 9 and 10, 1888. Edited by Clifford Richardson. 1888. Pp. 96. (Out of print.)
- No. 20. Record of Experiments Conducted by the Commissioner of Agriculture in the Manufacture of Sugar from Sorghum at Rio Grande, N. J.; Kenner, La.; Conway Springs, Douglass, and Sterling, Kans., 1888. By H. W. Wiley. 1889. Pp. 162. Price 10 cents. (Out of print.)
- No. 21. Report of Experiments in the Manufacture of Sugar by Diffusion at Magnolia Station, Lawrence, La. Season of 1888-89. By Guilford L. Spencer. 1888. Pp. 162. Price 10 cents. (Out of print.)
- No. 22. Record of Experiments at Des Lignes Sugar Experiment Station, Baldwin, La., during the Season of 1888. By C. A. Crampton. 1889. Pp. 36. (Out of print.)
- No. 23. Record of Experiments at the Sugar Experiment Station on Calumet Plantation, Pattersonville, La. By Hubert Edson. 1889. Pp. 42. (Out of print.)
- No. 24. Proceedings of the Sixth Annual Convention of the Association of Official Agricultural Chemists, held at the U. S. Department of Agriculture, September 10, 11, and 12, 1899. Edited by H. W. Wiley. 1890. Pp. 235. (Out of print.)
- No. 25. A Popular Treatise on the Extent and Character of Food Adulterations. By A. J. Wedderburn. 1890. Pp. 61. (Out of print.)
- No. 26. Record of Experiments in the Production of Sugar from Sorghum in 1879, at Cedar Falls, Iowa; Rio Grande, N. J.; Morrisville, Va.; Kenner, La.; College Station, Md.; and Conway Springs, Attica, Medicine Lodge, Ness City, Liberal, Arkalon, Meade, Minneola, and Sterling, Kans. By H. W. Wiley. Pp. 112. 1890. (Out of print.)
- No. 27. The Sugar-Beet Industry: Culture of the Sugar Beet and Manufacture of Beet Sugar. By H. W. Wiley. 1890. Pp. 262. (Out of print.)
- No. 28. Proceedings of the Seventh Annual Convention of the Association of Official Agricultural Chemists, held at the U. S. National Museum, August 28, 29, and 30, 1890. (Methods of Analysis of Commercial Fertilizers, Foods, and

Feeding Stuffs, Dairy Products, Fermented Liquors, and Sugars.) Edited by H. W. Wiley. 1890. Pp. 238. (Out of print.)

No. 29. Record of Experiments with Sorghum in 1890. By H. W. Wiley. 1891. Pp. 125. Price 10 cents.

No. 30. Experiments with Sugar Beets in 1890. By H. W. Wiley. 1891. Pp. 93. (Out of print.)

No. 31. Proceedings of the Eighth Annual Convention of the Association of Official Agricultural Chemists, held at Columbian University, Washington, D. C., August 13, 14, and 15, 1891. Edited by H. W. Wiley. 1891. Pp. 253. (Out of print.)

No. 32. Special Report on the Extent and Character of Food Adulterations, including State and Other Laws Relating to Foods and Beverages. By A. J. Wedderburn. 1892. Pp. 174. (Out of print.)

No. 33. Experiments with Sugar Beets in 1891. By H. W. Wiley. 1892. Pp. 158. (Out of print.)

No. 34. Experiments with Sorghum in 1891. By H. W. Wiley. 1892. Pp. 132. Price 10 cents. (Out of print.)

No. 35. Proceedings of the Ninth Annual Convention of the Association of Official Agricultural Chemists, held at the U. S. National Museum, Washington, D. C., August 25, 26, and 27, 1892. Edited by H. W. Wiley. 1892. Pp. 243 + xvii. (Out of print.)

No. 36. Experiments with Sugar Beets in 1892. By H. W. Wiley. 1893. Pp. 74. (Out of print.)

No. 37. Record of Experiments with Sorghum in 1892. By H. W. Wiley. 1893. Pp. 100. (Out of print.)

No. 38. Proceedings of the Tenth Annual Convention of the Association of Official Agricultural Chemists, held at Chicago, Ill., August 24, 25, and 26, 1903. Edited by H. W. Wiley. 1893. Pp. 218 + xiv. (Out of print.)

No. 39. Experiments with Sugar Beets in 1893. By H. W. Wiley with the collaboration of Walter Maxwell. 1894. Pp. 59. Price 5 cents.

No. 40. Record of Experiments with Sorghum. 1893. By H. W. Wiley with the collaboration of Messrs. Oma Carr and C. I. Hinman. 1894. Pp. 38. (Out of print.)

No. 41. Report on the Extent and Character of Food Adulteration. By A. J. Wedderburn. 1894. Pp. 64. (Out of print.)

No. 42. Compilation of the Pharmacy and Drug Laws of the Several States and Territories. By A. J. Wedderburn. 1894. Pp. 152. (Out of print.)

No. 43. Proceedings of the Eleventh Annual Convention of Official Agricultural Chemists, held at Washington, D. C., August 23, 24, and 25, 1894. Edited by H. W. Wiley. 1894. Pp. 403. (Out of print.)

No. 44. Sweet Cassava: Its Culture, Properties, and Uses. By H. W. Wiley. 1894. Pp. 16, pls. 2. (Out of print.)

No. 45. Analyses of Cereals Collected at the World's Columbian Exposition and Comparisons with other Data. By H. W. Wiley. 1895. Pp. 57. (Out of print.)

No. 46. Methods of Analysis Adopted by the Association of Official Agricultural Chemists, September 5, 6, and 7, 1895. Edited by H. W. Wiley, with the collaboration of L. L. Van Slyke and W. D. Bigelow. 1895. Pp. 84, figs. 4. (Out of print.)

No. 46. Revised. 1899. Pp. 86, figs. 4. Price 5 cents.

No. 47. Proceedings of the Twelfth Annual Convention of the Association of Official Agricultural Chemists, held at Washington, D. C., September 5, 6, and 7, 1895. Edited by H. W. Wiley. 1896. Pp. 172, figs. 2. (Out of print.)



No. 48. Zinc in Evaporated Apples. By H. W. Wiley. 1896. Pp. 38. Price 5 cents.

No. 49. Proceedings of the Thirteenth Annual Convention of Official Agricultural Chemists, held at Washington, D. C., November 6, 7, and 9, 1896. Edited by H. W. Wiley. 1897. Pp. 127. (Out of print.)

No. 50. Composition of Maize (Indian Corn), including the Grain, Meal, Stalks, Pith, Fodder, and Cobs. Compiled by H. W. Wiley. 1898. Pp. 31. Price 5 cents.

No. 51. Proceedings of the Fourteenth Annual Convention of the Association of Official Agricultural Chemists, held at Washington, D. C., October 26, 27, and 28, 1897. Edited by H. W. Wiley. 1898. Pp. 169. Price 10 cents.

No. 52. Experiments with Sugar Beets in 1897. By H. W. Wiley. 1888. Pp. 165, 2 maps. Price 20 cents.

No. 53. Chemical Composition of the Carcasses of Pigs. By H. W. Wiley (and others). 1898. Pp. 80. Price 5 cents.

No. 54. Report on an Investigation of Analytical Methods for Distinguishing between the Nitrogen of Proteids and that of the Simpler Amids or Amido-acids. By J. W. Mallet, Professor of Chemistry, University of Virginia. With a chapter on the Separation of Flesh Bases from Proteid Matters by Means of Bromin. By H. W. Wiley, Chief of Division of Chemistry. 1898. Pp. 30. (Out of print.)

No. 55. Fertilizing Value of Street Sweepings. By E. E. Ewell. 1898. Pp. 19. Price 5 cents.

No. 56. Proceedings of the Fifteenth Annual Convention of the Association of Official Agricultural Chemists, held at Washington, D. C., November 11, 12, and 14, 1898. Edited by H. W. Wiley. 1899. Pp. 140. Price 10 cents.

No. 57. Proceedings of the Sixteenth Annual Convention of the Association of Official Agricultural Chemists, held at San Francisco, July 5, 6, and 7, 1899. Edited by H. W. Wiley. 1899. Pp. 130. Price 10 cents.

No. 58. The Manufacture of Starch from Potatoes and Cassava. By H. W. Wiley. 1900. Pp. 48, pls. 8. Price 10 cents.

No. 59. The Composition of American Wines. By W. D. Bigelow. 1900. Pp. 76. Price 5 cents.

No. 60. The Sunflower Plant: Its Cultivation, Composition, and Uses. By H. W. Wiley. 1901. Pp. 31, pl. 1, figs. 2. Price 5 cents.

No. 61. Pure Food Laws of European Countries affecting American Exports. By W. D. Bigelow. 1901. Pp. 39. Price 5 cents.

No. 62. Proceedings of the Seventeenth Annual Convention of the Association of Official Agricultural Chemists, held at Washington, D. C., November 16, 17, and 19, 1900. Edited by H. W. Wiley. 1901. Pp. 163, pls. 2. Price 10 cents.

No. 63. Exhibit of the Bureau of Chemistry at the Pan-American Exposition, Buffalo, New York, 1901. Prepared under the direction of Harvey W. Wiley, Chief Bureau of Chemistry, by E. E. Ewell, W. D. Bigelow, and Logan Waller Page. Pp. 29, pls. 4. Price 5 cents.

No. 64. The Influence of Environment upon the Composition of the Sugar Beet. By Harvey W. Wiley. 1901. Pp. 32, charts 3. Price 5 cents.

No. 65. Provisional Methods for the Analysis of Foods. Adopted by the Association of Official Agricultural Chemists, November 14, 15, and 16, 1901. Edited by H. W. Wiley. 1902. Pp. 169, figs. 7. Price 10 cents.

No. 66. Fruits and Fruit Products: Chemical and Microscopical Examination. Prepared under the direction of W. D. Bigelow, by L. S. Munson, L. M. Tolman, and Burton J. Howard. 1902. Pp. 114, pls. 12. Price 20 cents.

No. 67. Proceedings of the Eighteenth Annual Convention of the Association



of Official Agricultural Chemists, held at Washington, D. C., November 14, 15, and 16, 1901. Edited by H. W. Wiley. 1902. Pp. 184, frontispiece. Price 10 cents.

No. 68. The Chemical Composition of Insecticides and Fungicides, with an Account of the Methods of Analysis Employed. By J. K. Haywood in cooperation with the Division of Entomology. 1902. Pp. 62, fig. 1. Price 5 cents.

No. 69. Foods and Food Control. By W. D. Bigelow. 1902.

Part I. A compilation of the Federal food laws, together with the food laws of Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Hawaii, and Idaho. Pp. vi, 1-93. Price 5 cents.

Part II. Food laws now in force in Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, and Michigan. Pp. vi, 95-187. Price 5 cents.

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